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AUTHOR Dallinger, Judith M.
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ABSTRACT

Noting that networks of relationships between individuals and groups form organization-wide patterns that provide both the structure and the means of sustaining an organization, this paper argues that a complete understanding of organizations requires a basic understanding of these networks. Following a brief discussion of the nature of communication networks, the paper describes a model indicating aspects of communication networks that have been and need to be investigated. The described model includes three categories of potential interest: (1) the communication networks themselves, (2) inputs relevant to communication networks, and (3) the relationships between output and communication networks. Following the development of the model, the paper presents a review of communication network research categorized according to the model. (FL)

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COMMUNICATION NETWORKS:

A LITERATURE REVIEW

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by

Judith M. Dallinger

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This paper describes a model indicating categories of research on communication networks which have been, and need to be investigated. The model includes three categories of potential interest. First, there are the communication networks themselves. The other two categories include research investigating the relationship between various input and output variables and communication networks. Following the development of the model, the paper concludes with a review of communication networks research categorized according to the model.

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Description of the necessary and sufficient components of organizations has defied consensus. However, most scholars would agree that an organization consists of a minimum of two people who are working together toward a common end. Additional features, such as hierarchy of authority, division of labor, and interdependence are often, though not consistently, included in formal definitions. A concise definition which incorporates many basic elements has been offered by Schein: "an organization is the rational coordination of the activities of a number of people for the achievement of some common explicit goal or purpose, through division of labor and function, and through a hierarchy of authority and responsibility (1965, p. 8). The primary means by which these activities are integrated and coordinated in communication. In fact, communication is the essential ingredient which structures an organization. Organizations are comprised of ideas, abilities, and messages which are organized or constrained into objective-accomplishing organisms by means of the creation of communication channels (Katz and Kahn, 1978).

In addition to providing the basis for an organization's formation and internal coordination, communication is required if an organization is to continue and interact with the environment. Thayer has described communication "as the dynamic process underlying the existence, growth, change, the behavior of all living systems - individual or organization (1968, p. 17). By allowing the organization to interact with its environment, communication helps maintain the input, throughput and output circular process (Thayer, 1968).

Communication Networks

Communication within the organization occurs dyadically. A dyadic relationship is a direct, face to face interaction between two people. These relationships tend to be circular. That is, if a person (A) communicates a message of some sort to another (B), that elicits a response from B to A, which similarly involves a response from A to B (Weick, 1979). These interlocked behaviors occur between the various members of the organization and tie one member to another. Most organizational members maintain relationships with several others, each of whom is likely to have dyadic links with still others. These patterns of ongoing relationship (between individuals and/or groups) generate the communication which was described earlier as the essence of an organization. The communication patterns of such ongoing relationships may be thought of as communication networks.

Networks of relationships between individuals and groups form organization-wide patterns which provide both the structure and means of sustaining the organization. Thus a complete understanding of organizations requires a basic understanding of these networks. Dorsey (1957) points out that communication studies of individuals are not sufficient.

The primary organizing process within organization, then, is communication, and communication takes place within networks. In order to understand organizational functioning, one must develop an understanding of those underlying communication networks. In order to review communication network research, a basic understanding of network functions and roles is required.

Functions of Communication Networks

In every organization there are several communication networks which exist simultaneously. For instance, organizational members receive and send messages about the job which they are doing, and at the same time, they communicate with others in a social manner. A variety of functions for communication have been described (Guetzkow, 1965; Thayer, 1968; Berlo, 1969; Redding, 1972; Rogers and Agarwala-Rogers, 1976). While one might take a number of different perspectives in studying communication functions, two types of network seem especially useful. The first is a task function. It exercises formal authority and is concerned with information concerning the job that each employee is doing. Second is a social function. This involves communication which is not related to the job, but is related to the organizational members' needs for making friends, maintaining self concept, and so forth. The importance of these two functions is that each generally produces a distinct network which can be observed separately. Although often they overlap. when examining a network one must be sure to focus on only one network function at a time (Roberts and O'Reilly, 1978).

Communiation Network Roles

A person's place within a network is defined by his/her and other peoples' reports of their dyadic relationships and is called his/her role. A number of roles have been described, and commonly distinguish between participants and non-participants (Farace, et. al., 1977). Within the participant category, network members can be further distinquished into groups and those individuals who link groups together (Farace, et. al., 1977).

The isolate role is one that is enacted when the member indicates he/she has few or no relationships in the organization relevant to the particular function of network being investigated. The second role that a network member may occupy is that of group member. Groups consist of several people who have indicated that they have more ties with each other than with other organization members outside the group. Third is the liason role. This role is occupied by the member who has dyadic relationships with members of two or more groups, but who still does not qualify as a member of any group.

Model of Network Research

In order to integrate research relevant to communication networks in organizations, a classifacatory model is useful. To describe such a model, one must consider the types of questions that are valuable to ask about networks. Because of their importance in the development as well as the maintenance of organizational functioning, a plethora of questions present themselves concerning how communication networks operate within the organization, and how other aspects of organizational life affect as well as are affected by communication networks.

At a very simplistic level, a communication researcher may ask questions such as: what do networks look like, how do they differ for different functions of communication, what network roles emerge within each network, how many organizaiton members will enact particular role behaviors, and which networks actually emerge in any given organization? More complicated questions may occur concerning the relationship that communication networks have with other variables in the organization. For example: what are the characteristics of people who enact various network roles: is role enactment correlated with personality variables -

with variables having to do with the peron's place within the organization; what sorts of individual outcomes are related to enacting a particular role in a communication network; what relationship is there between overall organizational variables (e.g., size, technology) and communication networks, and what is the relationship between communication networks and organizational outcomes? At the most difficult level to investigate, questions arise such as what causes communication networks to emerge as they do?

From these types of questions, a model can be developed which will allow one to categorize research that has been conducted on communication networks. Katz and Kahn's (1978) systems model of organizational functions provides three characteristics that can be used in examining networks. Input, throughput and ourput each include physical operations and components as well as human behaviors and relations. That is, inputs include raw materials plus human intelligence, expertise, and so forth. Throughput refers to transformation of the physical product, as well as expenditure of human energy. Likewise Katz and Kahn describe outcomes as the products which are produced as well as human's knowledge gain, and so forth.

The input, output and throughput characteristics can be used to focus on communication networks specifically. First, throughput in terms of networks would focus on the functioning of communication networks themselves. Much descriptive work needs to be done to provide a clear and useful picture of what communication networks are, and of roles and other network properties that emerge in actual organizations. Research efforts in describing networks might be placed along a continuum from individual to overall network focus. Some research narrows in or the roles which are enacted by various members, and others attempt to describe

groups, units, or overall networks.

Secondly, inputs relevant to communication networks can be researched. Utilizing an individual to organizational continuum in developing this concept is useful. At the individual level, inputs are those things which are inherent in the individual, or are interpersonally connected to the individual. For example, personality variables would be an inherent individual input and attraction or similarity would be interpersonal inputs for an individual. At the other end of the continuum, the overall organizaton, inputs would be such variables as cohesiveness of a group or department, and organizational climate. Figure A presents this continuum as horizontal within the organization. Alternatively, inputs can be classified on a continuum ranging from primarily intrinsically controlled to primarily extrinsically controlled (intrinsic and extrinsic to human control). This continuum can be pictured as orthogonal to the previous continuum (see Figure B). Using the letters assigned to the quadrants for reference, some examples will make the difference between these two continua clear. Quadrant A, individual level and intrinsic to human control, would include such variables as those previously described, personality variables and personal skills (e.g., need for achievement, machiavellianism, public pseaking skills). Likewise, quadrant B would include those variables mentioned earlier for the organizational end of the continuum: cohesiveness and climate. The interpersonal variables would fall somewhere in between the organizational and individual ends of the horizontal continuum, somewhat choser to the latter, but in the top two quadrants. Each of the variables included in the upper part of the human control continuum are dependent on human cognition and action and

integration of human cognition and action. Organizational climate, for instance, is developed through member's friendship overatures and helpfulness to each other and other similar cognitive/behavioral actions.

Quadrant C (individual level and extrinsic to human control) includes variables such as level in the authority hierarchy and job types. Finally, quadrant D, organizational level and extrinsic to numan control, includes variables like organization size and technology. Thus, concepts falling in the lower protion of the human control continuum are less dependent upon individual cognitions and more dependent of the nature or objective of the organization. The job that an individual takes is certainly dependent on his wishes for a particular type of job, but the work that s/he does is primarily mandated by the type of organization in which s/he is working. E.g., although Joe wishes to work with machinery, the fact that he runs a particular drill press at Acme Corporation is primarily because Acme manufactures sub compact cars and not because Joe likes that size of drill press best. (The distinction between the intrinsic and extrinsic ends of the human control dimension is more evident in factory type assembly line jobs, perhaps, than in college professors or atomic scientists, and may be bounded by particular types of professions.)

A third category of research (illuminated by the questions about communication networks) includes the relationship between output and communication networks. Again, a continuum from the individual to the overall organizational level is useful. At the individual level are those variables such as satisfaction. individual productivity, and such. Toward this end are, interpersonal outputs like friendships developed. The organizational end of the output continuum includes such variables

as organizational efficiency and organizational productivity.

From the communication network point of view, inputs and outputs are important for their relationship to the communication network (variables in each of these categories have been included in a multitude of research efforts for their own intrinsic value as well as in relation to other variables and to each other). A simplistic model of these relationhips is provided in Figure C.

As more research becomes available, a more complex picture of the model could be developed that would indicate the relationships between each section of the continua of one major category to each section of the continua in the other categories. The lines indicating the relationships are shown pointing both ways between the major categories. Thus either category of variables may affect the other or the effect may be reciprocal. This corresponds to the questions considered as most difficult to answer--what causes communication networks to emerge as they do. The question, viewing the model, becomes even more complicated. Does the communication network cause organizational outcomes or vice versa, or are they mutually causal? Similarly, do inputs cause the communication network to emerge in a particular way, or does the communication network cause the input variables, or are they mutually causal? To date, no research has been conducted which has tested any of these questions.

Use of the model presented will aid in an examination of the existing research to determine what sorts of knowledge about communication networks in organizations has been discovered. Focusing upon communication will eliminate some parts of the model as relevant in the review. Studies concerned only with input or output variables (or with the relationship

between the two categories of variables) that don't investigate communication networks as well will be excluded. Studies that are included are those utilizing primarily a role enactment approach to communication networks in organizations.

Review of Research

Research conducted on communication networks within organizations are categorized into the following areas; descriptive of communication networks (throughput), relationship of communication networks to output variables, and relationship of communication network to input variables in the following quadrants: A (individual level, intrinsic human control), B (organizational level, intrinsic human control), C (individual level, extrinsic human control, and D (organizational level, extrinsic human control). Much of the research includes questions in several of these categories, and will be discussed in each relevant section.

Descriptive of Communication Networks

Several of the earliest studies of communication networks in overall organizations were primarily descriptive of the networks which were discovered. Jacobson and Seashore (1951) wanted to determine if communication network were a useful way of looking at organizational structure. From their study in a federal agency (above the clerical level) they concluded that networks were, in fact, useful in this capacity. Jacobson and Seashore set out to find which groups organizational members belonged to, and in the process, discovered the liason role. Network members perceived that there were more hierarchial levels of power in the organization than were actually indicated in the formal organizational chart. After Jacobson and Seashore made this first attempt, research of this type did

not reappear until the late 1960's, although much of the laboratory type research on small group communication networks was completed in the interim. Lack of a suitable computer program that identifies communication roles and network properties primarily accounted for this break in research. However, early in the 1970's such a program was developed and has been used in the majority of the recent studies of this type (Richards, 1974, 1975).

Wickesburg (1968) conducted an exploratory study concerned with determining the types of networks that occur in organizations, and if those types differ for managers and non-managers. This study utilized a diary procedure from 91 businessmen who were not members of the same organization. Wickesburg found five purposes of communication networks including: information received or disseminated, instructions given or received, approval given or received, problem solving categories, and non-business related communication. Using frequency and qualitative data, he found very few differences between the communication of managers and non-managers. O'Reilly and Roberts (1977) and Roberts and O'Reilly (1978) studies were primarily descriptive of overall communication networks and roles within those networks. In their series of studies, Roberts and O'Reilly utilized measures of communication networks within navy organizations that were made at two separate times, one year apart. Thus they were able to provide valuable information about the changes in communication networks over time. For their overall organization analysis they utilized the new computer program developed by Richards (1975), and thus could investigate communication roles. Some of their important findings in developing an understanding of network processes include: similarity between emergent networks and the organizational chart (although the

networks had more small groups and more across unit linkages than did the chart); 70 to 80% of the members of the task and social networks were participants rather than isolates (this per entage was somewhat smaller in the formal authority network); people remained in the same roles consistently over time; more isolates became participants over time than vice versa; there were more groups and more group members at the second measuring time; there were the most liasons in the expertise network, second most in the social network and least in the athority network; and finally this study constituted an empirical demonstration of the co-existence of formal and informal networks in the organization. These studies provide a basis for understanding network operation within real organizations. Additional information comes from studies focusing more upon relationships between networks and other organizational variables. Much of this research docused on the liason role. Liasons were perceived by others (as well as themselves) as having more contacts and access to more information than other role occupants and thus confirmed the conceptual definition of liasons (Mac Donald, 1976; Schwartz and Jacobson, 1977; Reynolds and Johnson, 1981; Albrect, 1979).

Communication Networks and Outcome Variables

Research which has investigated questions linking communication networks to outcome variables has been sparse, and the little that has been accomplished has been limited to those outcome variables which would fall in the individual end of the outcome continuum (see model). MacDonald (1976) found that liasons are more satisfied with the messages they receive from top management that are group members. Schwartz and Jacobson (1977) found that liasons (as compared to other organizational

members) have more links to people with access to the organizational power structure; are rated as more influential and persuasive; and are more frequently perceived as opinion leaders for non-liasons. Roberts and O'Reilly (1979) found that participants have higher job satisfaction, higher performance levels, but not greater committment to the organization than isolates. Lester (1981) hypothesized that as the degree of a network member's connectedness increases, their job satisfaction will also increase, but failed to find support for her hypothesis. Reynolds and Johnson (1981) reviewed literature indicating that liasons in an organizational communication network are perceived as having more influence and status than others.

Too little research has been done in this area to develop any clear conclusions about those variables which have been examined, and very few of the numerous variables which make up organizational outcomes have even been included in communication network research. Clearly more research is needed in this area.

Individual Level and Intrinsic Human Control (Inputs)

Research in this quadrant of the input category has focused on the relationship between communication network role enactment and personality type variables as well as demographic variables. Schwartz and Jacobson (1977) examined differences between the liason role and other network members on age, tenure, and time committed to research,but found no significant differences. Lincoln and Miller (1979) found general support for the idea that attributes of organizational participants such as sex, race, ethnicity and socioeconomic background are more influential in structuring their primary (social) networks than their influential (task or authority) networks. Roberts and O'Reilly (1979) compared

participants to isolates and drew three conclusions. Participants are generally more educated, participants have somewhat less need for self-actualization than do isolates, and finally participants do not have a higher need for achievement or need for power than do isolates. Reynolds and Johnson (1981) observed that demographics seem to make little difference in communication network role enactment in their review of theoretical and empirical treatments of the relationship between liason role occupancy and the need for upward mobility, cognitive complexity, preference for uncertainty, tolerance and ambiguity, and the need for information.

As pointed out by Reynolds and Johnson, demographics have not often correlated with network role enactment, although not a great deal of research has been done in this area. In the area of personality variables, there is a lack of research using interpersonal input variables (attraction, similarity). Again, this area needs additional research to determine if demographics fail to affect communication role enactment, and to pinpoint the relationship between other individual inputs and communication networks.

Organizational Level and Intrinsic Human Control (Inputs)

Research in the area of the input quadrant should focus upon the relationship between the communication network and group or organizational level inputs (such as cohesiveness and the organizational climate). MacDonald (1976) found that liasons did not perceive the organizational work-related communication system to be more open that did non-liasons. Danowski (1980) found that in production networks, as connectivity increased, uniformity of group members' attitudes increased. The maintenance network failed to produce this relationship. Reynolds and Johnson (1981) reviewed literature concerning the relationship between networks and climate.

The lack of studies in this area does not allow conclusions to be drawn about the relationship, but results of those few studies done indicate that future research may be rewarding in helping to form a basis of knowledge about communication networks in organizations.

Individual Level and Extrinsic Human Control (Inputs)

Research in this area focuses on the relationship between organizational communication networks and variables such as an individual's level in the organizational authority hierarchy and the job that he holds. MacDonald (1976) found qualified support for the hypothesis that liasons inthe production network are more likely than liasons in other networks to hold formal authority supervisory positions. Schwartz and Jacobson (1977) found that many administrators fulfilled liason roles in the communication network. Lincoln and Miller (1979) found that instrumental ties (task or authority) between low status members of the organization are less direct than are those ties between low and high status members. Further, ties between two high status members are closest of the three types of ties. Roberts and O'Reilly (1979) found that participants are higher in rank than are isolates and Reynolds and Johnson (1981) concluded that liasons often hold administrative positions. Thus it seems fairly clear that member's possessing higher ranks in theorganizational hierarchy are more often liasons than other organizational members. Group member's may have higher ranks than isolates.

Research in the other area of extrinsic human control inputs has been only tentative. Albrect (1979) using force aggregation theory, found large differences between key communicators (liasons) and non-key communicators concerning their jobs, management, organizational policies and the union.

Lester (1981) investigated network member's connectiveness and radiality in relation to several task variables. A low connectedness score is associated with an isolate, a low radiality score corresponds to a group member, and a high radiality score indicates a liason. She obtained no support for her hypothesis that tasks which require coordination are often accomplished by individuals who have high connectedness scores. However, as functional duplication of the task increased, the incumbent's scores decreased. Finally, she found that member's who's jobs varied in routineness were not systematically different in connectedness.

These findings seem to indicate that there may be some relationship between the job and communication role enactment. Thus research investigating this relationship is needed.

Organizational Level and Extrinsic Human Control (Inputs)

There is a complete absence of research related to this area of organizational inputs. Exploratory research is needed to examine the relationship between organizational level inputs which are extrinsic to human control, and communication networks and role enactment.

It is evident from this review of research that much more research is needed on all aspects of communication networks in organizations if one is to fully understand their functioning. The model provides a valuable method of categorizing past research on communication networks, and highlighting areas in which future research should be conducted.

Some basic descriptive research on communication networks has provided valuable information regarding their functioning in organizations, and more research in this area may help to build upon this basis of knowledge. Research investigating the relationship between networks and output

variables is needed in the individual end of the output continuum in order to append the small amount which has been done, and new exploratory research is needed for the organizational end of the continuum. Research examining the relationship between networks and input variables was discussed in each of the four quadrants. In quadrant A, research indicates that demographics do not seem to provide much useful information in determining which roles are enacted in the network. However, more research is needed focusing on personality variables and skills. Although very little research has been done falling in quadrant B, it seems to be a fruitful area for research. Quadrant C includes research which seems to support the conclusion that higher levels in the authority hierarchy are associated with the liason role, and some indication has been found that the job itself may be related to network roles. Finally, quadrant D is totally absent of research and should be examined in the future to determine if relationships exist in this area.

Only a small quantity of information is available about communication networks in overall organizations at present. The present model points to several areas in which confirmatory as well as exploratory research is needed in order to more fully understand organizational communication network functioning.

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Figure A

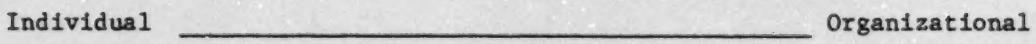

Figure B

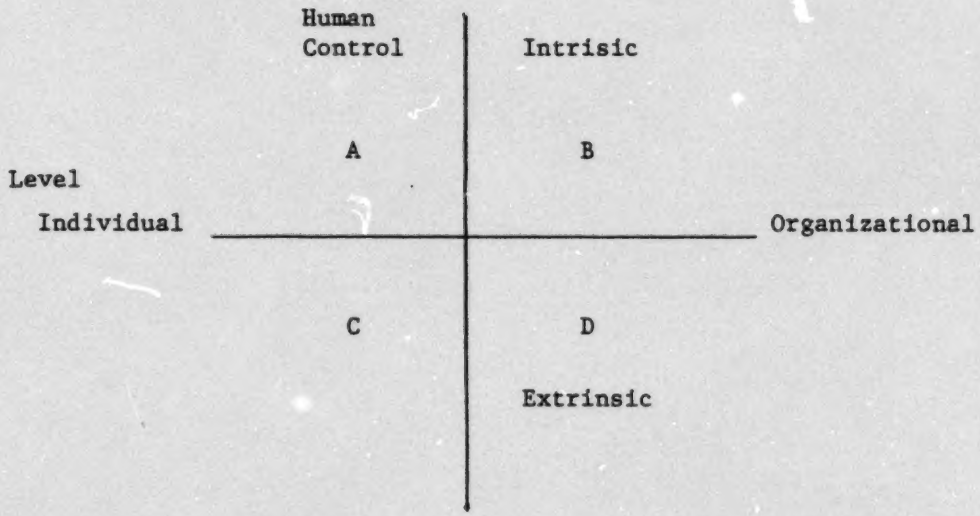

Figure C